



# California Energy Balances

**Presentation for the California Energy Commission's  
First Annual Climate Change Conference  
*From Climate to Economics:  
Anticipating Impacts of Climate Change in California***

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# Goals of the Project

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- Develop a database and system that may be adopted by the CEC as its official multi-fuel database that accounts for all production, import/export, transformation, and consumption of energy in California
- Centralize energy flow data for California that could be used to estimate GHG emissions
- Reconcile different sources of data
- Provide energy statistics for the CGE modeling work being carried out by UC Berkeley
- Serve as an analytical tool for tracking trends in California energy use and GHG emissions

# California Energy Balances Data Sources and Data Quality

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- Data Sources:
  - U.S. Energy Information Administration
  - California Energy Commission
  - U.S. Geological Survey
  - Other sources
- Data Quality:
  - Primary data: used in database
  - Alternate data: another source, but judged to be less reliable than primary data source
  - Supplemental data: data that provide a greater degree of disaggregation but are incomplete subsets of a larger category or deemed less reliable than more aggregate data

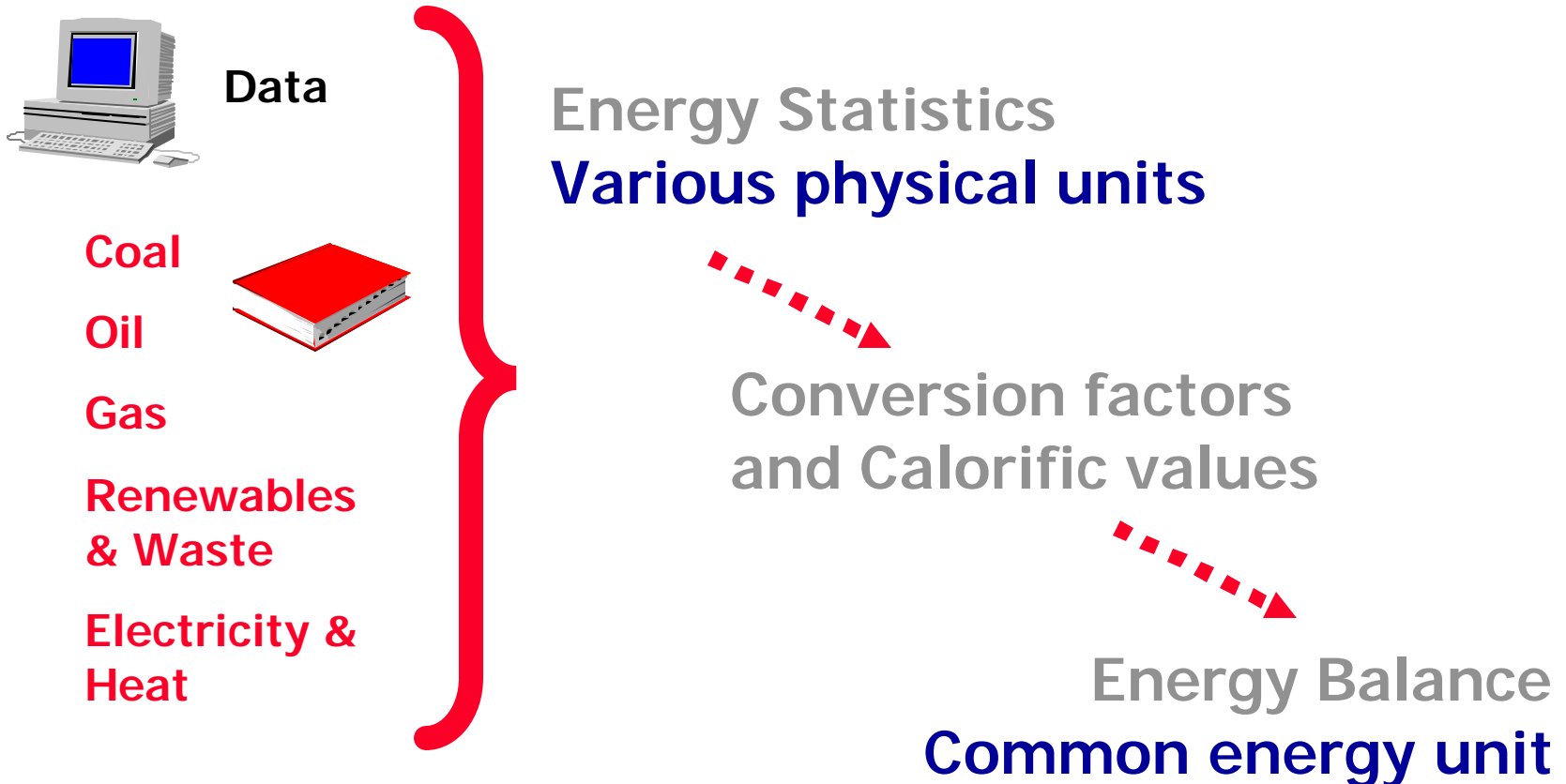
# California Energy Balances: CALEB Database

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- Modeled on the International Energy Agency's energy balances
- Contains data on energy supply, transformation, and consumption for 1990 to present
- Displays data in various units:
  - Physical (e.g. cubic feet of natural gas, short tons of coal)
  - Energy
    - English units (Btus)
    - Standard International units (Joules)
    - IEA (toe)
  - GHG emissions
    - Carbon
    - Carbon dioxide

# Constructing Energy Balances



# Example of an Energy Balance



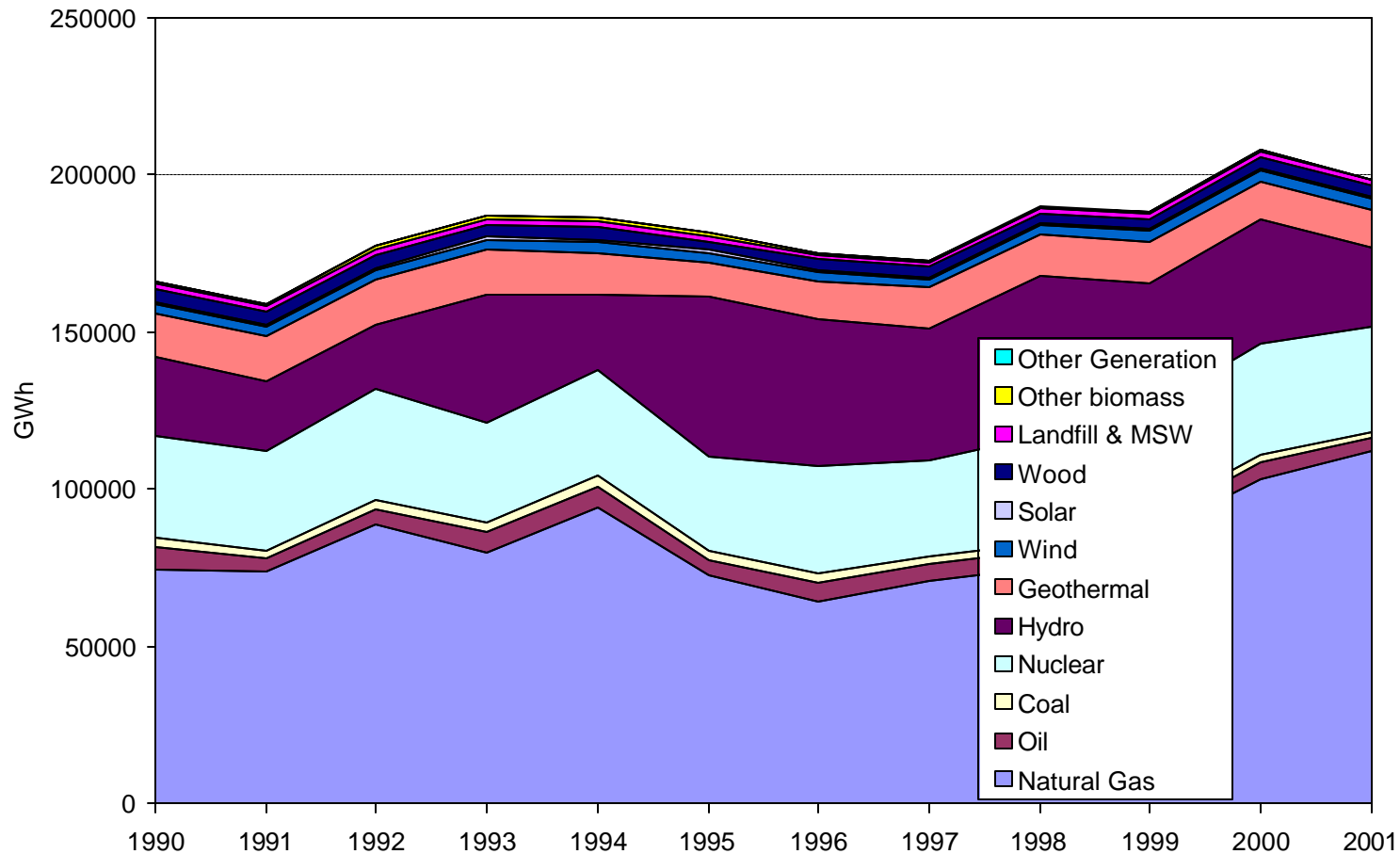
	Natural Gas	Crude Oil	Other Petroleum Products	Coal	Primary Electricity (e.g. hydro)	Electricity
<b>Energy Supply</b>						
Production	+	+	N/A	+	+	N/A
Import	+	+	+	+	+	+
Export	-	-	-	-	-	-
Bunker Fuels	N/A	N/A	-	N/A	N/A	N/A
Net Stock Withdrawals	+/-	+/-	+/-	+/-	N/A	N/A
<b>Transformation</b>						
Electric Plants	-	N/A	-	-	N/A	+
Refineries	-	-	+	N/A	N/A	-
<b>End Use Consumption</b>						
Industry	-	-	-	-	-	-
Transport	-	-	-	-	-	-
Residential Bldg	-	-	-	-	-	-
Commercial Bldg	-	-	-	-	-	-
<b>Electricity Output</b>	+	+	+	+	+	+

# California Energy Balance: 2000



TBtu	Nat Gas	NGL	Crude	Petro Prods	Coal	Nuclear	Hydro	Other Ren	Biomass	Electricity	Total
<b>Energy Supply</b>	<b>2,252</b>	<b>32</b>	<b>3,711</b>	<b>20</b>	<b>136</b>	<b>364</b>	<b>134</b>	<b>434</b>	<b>85</b>	<b>247</b>	<b>7,415</b>
Production	357	32	1,783	0	0	364	134	434	85	0	3,189
Import	1,885	0	1,928	470	135	0	0	0	0	247	4,665
Export	-37	0	0	-199	0	0	0	0	0	0	-236
Bunker Fuel	0	0	0	-251	0	0	0	0	0	0	-251
Net Stock Withdrawal	47	0	0	0	1	0	0	0	0	0	48
<b>Statistical Differences</b>	<b>96</b>	<b>-32</b>	<b>-27</b>	<b>-80</b>	<b>-64</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>6</b>	<b>17</b>	<b>-85</b>
<b>Transformation Sector</b>	<b>-942</b>	<b>0</b>	<b>-3,684</b>	<b>3,468</b>	<b>-24</b>	<b>-364</b>	<b>-134</b>	<b>-434</b>	<b>-85</b>	<b>710</b>	<b>-1,488</b>
<b>Electric Sector</b>	<b>-942</b>	<b>0</b>	<b>0</b>	<b>-50</b>	<b>-24</b>	<b>-364</b>	<b>-134</b>	<b>-434</b>	<b>-85</b>	<b>710</b>	<b>-1,322</b>
CHP, Commercial Power	-13	0	0	0	0	0	0	0	0	6	-8
CHP, Electric Power	-151	0	0	-10	-21	0	0	0	0	79	-103
CHP, Industrial Power	-90	0	0	-24	-3	0	0	0	0	57	-61
Electric Generators, Utilities	-130	0	0	-2	0	-364	-130	0	0	292	-332
Electric Generators, IPP	-558	0	0	-14	0	0	-4	0	0	200	-377
Non-specified (Elec. Generation)	0	0	0	0	0	0	0	-434	-85	77	-442
<b>Oil Refineries</b>	<b>0</b>	<b>0</b>	<b>-3,684</b>	<b>3,518</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>-166</b>
<b>Energy Sector</b>	<b>-408</b>	<b>0</b>	<b>0</b>	<b>-339</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>-34</b>	<b>-781</b>
Power Plants' Own Use	0	0	0	0	0	0	0	0	0	0	0
Oil Refineries' Own Use	-142	0	0	-339	0	0	0	0	0	-21	-502
Oil and Gas Extraction	-266	0	0	0	0	0	0	0	0	-13	-279
<b>Distribution Losses</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>-77</b>	<b>-77</b>
<b>End Use Sector Consumption</b>	<b>998</b>	<b>0</b>	<b>0</b>	<b>3,069</b>	<b>48</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>6</b>	<b>863</b>	<b>4,984</b>
Agriculture	18	0	0	0	0	0	0	0	0	22	40
Mining	6	0	0	0	0	0	0	0	0	3	9
Manufacturing Sector	215	0	0	97	47	0	0	0	0	136	496
Transport Sector	13	0	0	2,780	0	0	0	0	6	8	2,806
Services	204	0	0	0	1	0	0	0	0	375	579
Residential	529	0	0	16	0	0	0	0	0	275	819
Non-specified (Other Sector)	14	0	0	0	0	0	0	0	0	45	59
Non-Energy Use	0	0	0	177	0	0	0	0	0	0	177
<b>Electricity Output in GWh</b>	<b>103,236</b>	<b>0</b>	<b>0</b>	<b>5,527</b>	<b>2,364</b>	<b>35,176</b>	<b>39,272</b>	<b>16,341</b>	<b>6,184</b>	<b>0</b>	<b>208,100</b>
CHP, Commercial Power (GWh)	1,710	0	0	1	0	0	8	0	0	0	1,719
CHP, Electric Power (GWh)	20,188	0	0	961	1,902	0	0	0	0	0	23,051
CHP, Industrial Power (GWh)	12,992	0	0	3,095	461	0	0	22	0	0	16,570
Electric Generators, Utilities (GWh)	12,412	0	0	145	0	35,176	37,980	0	0	0	85,713
Electric Generators, IPP (GWh)	55,934	0	0	1,325	0	0	1,284	0	0	0	58,543
Non-specified (Elec. Generation, GWh)	0	0	0	0	0	0	0	16,319	6,184	0	22,503

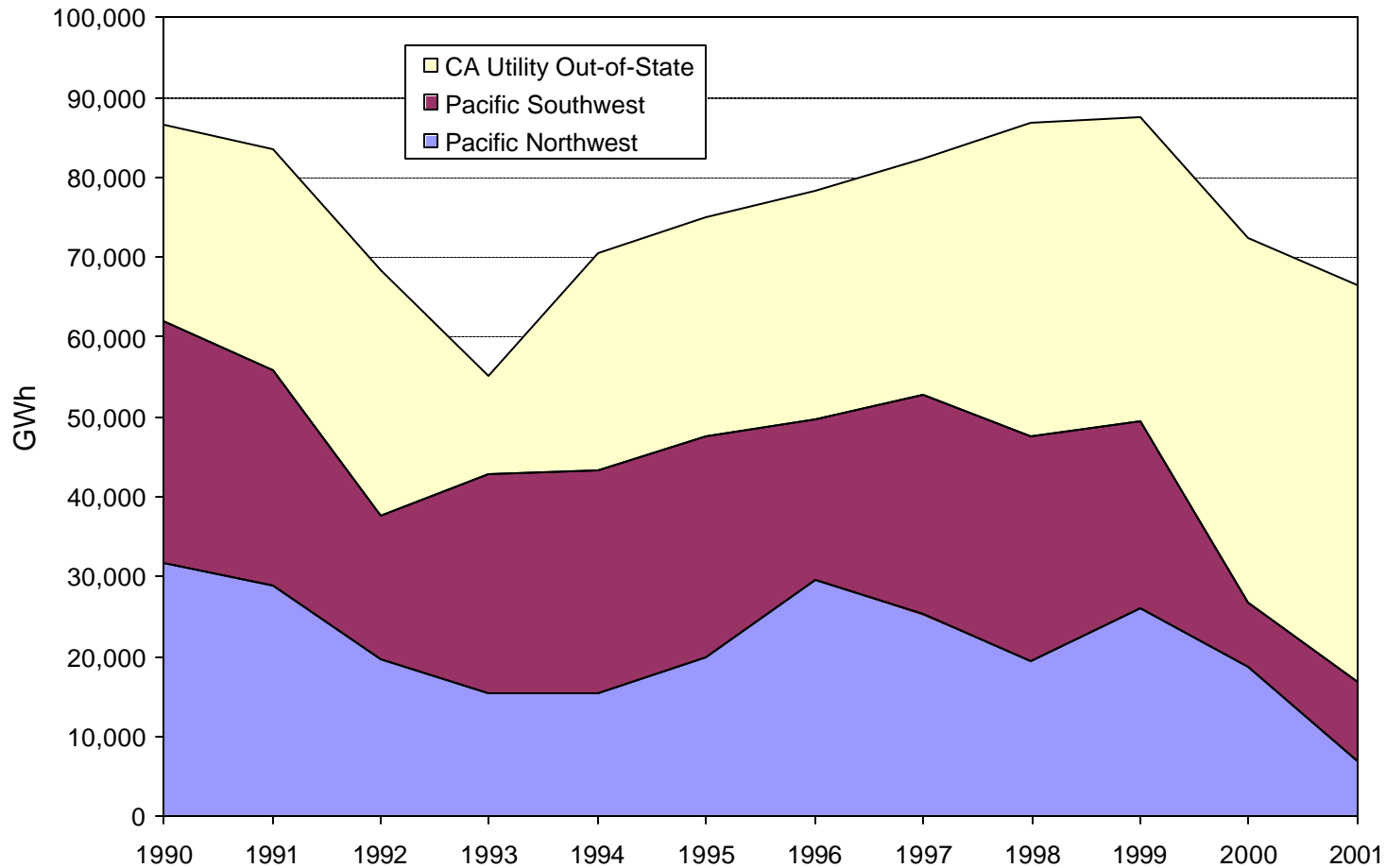
# Electricity Produced in California by Type of Primary Energy Input, 1990 to 2001



Source: EIA, various years

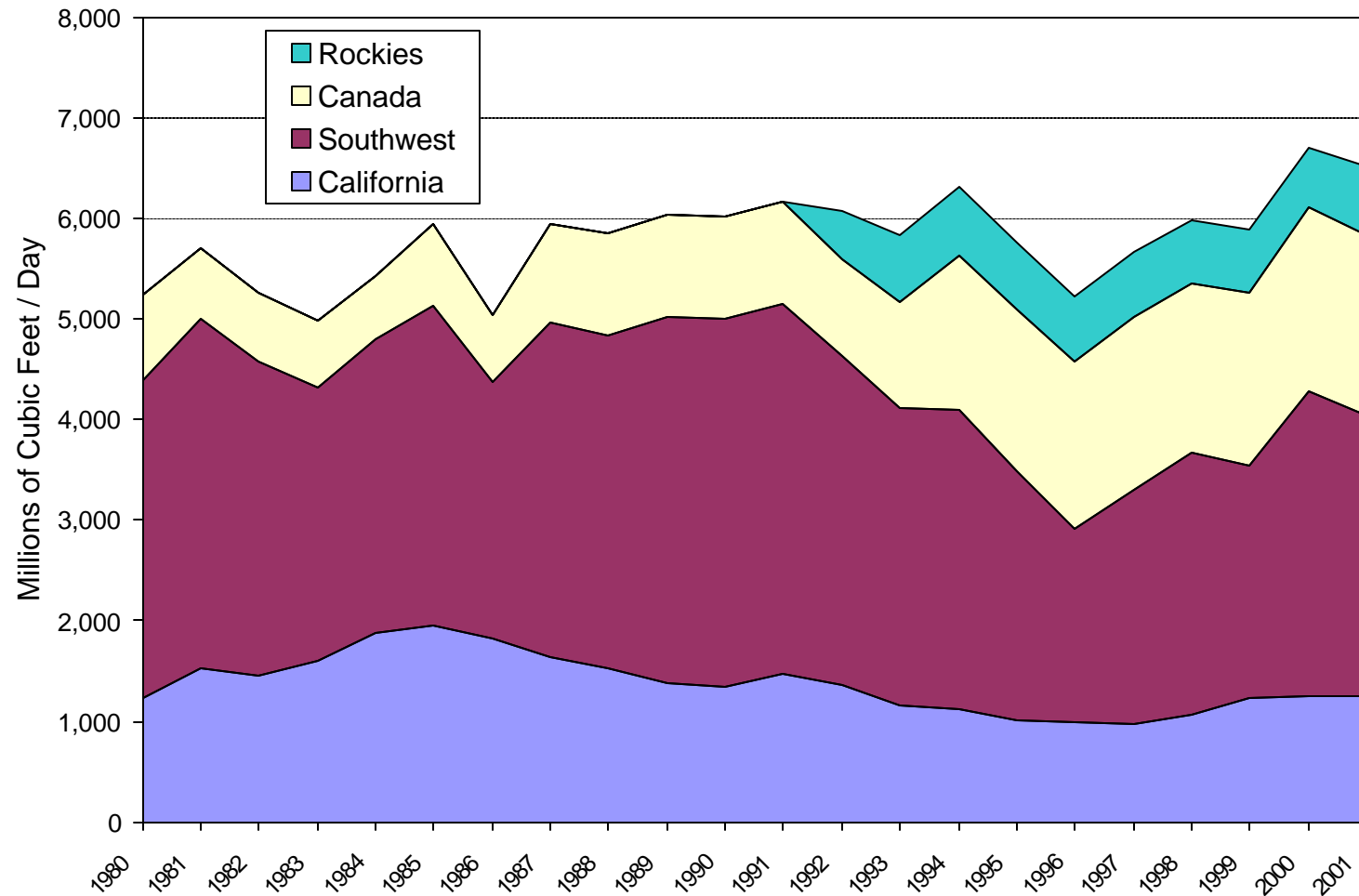


# Electricity Imported to California, 1990 to 2001



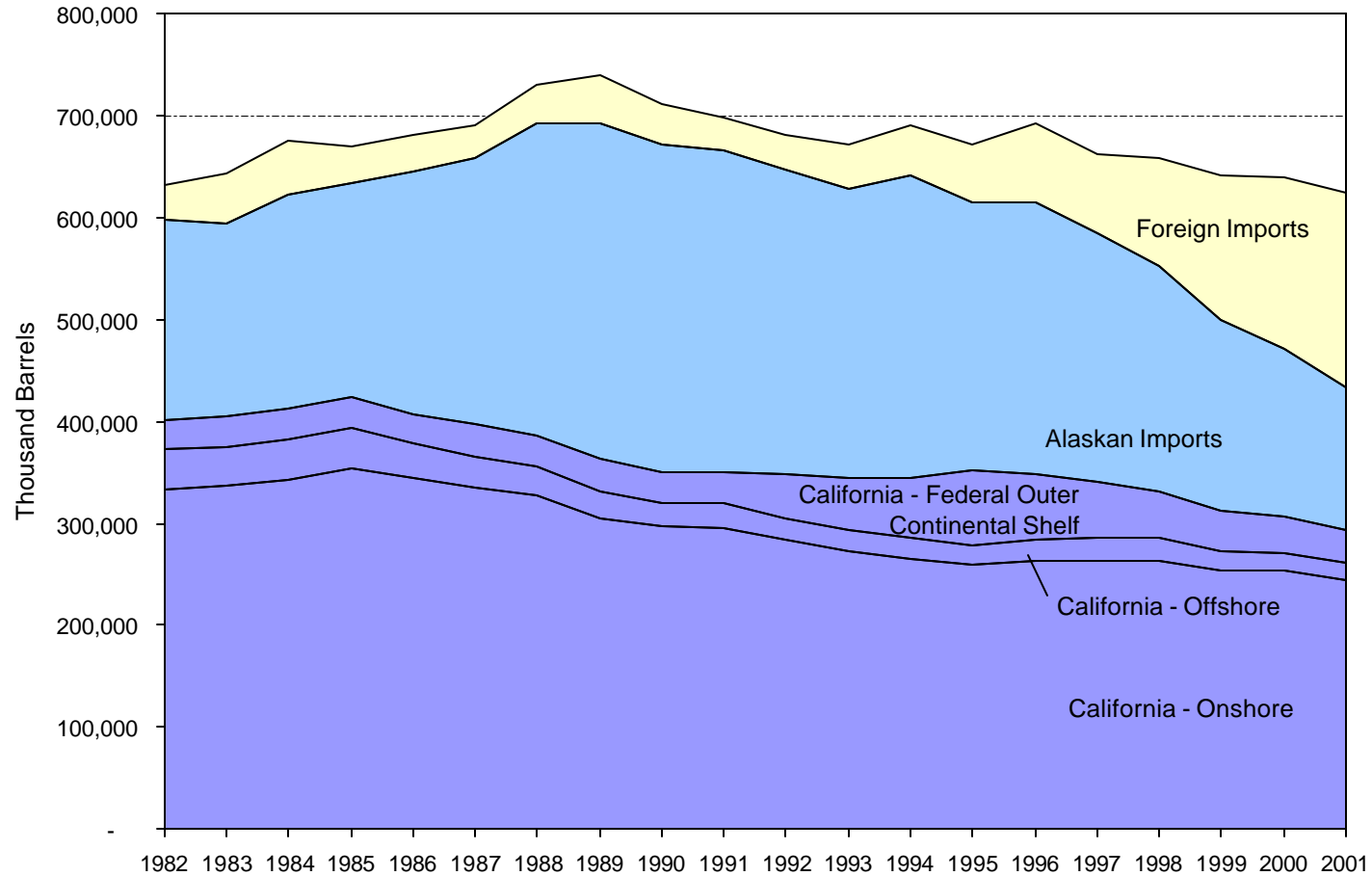
Source: CEC, 2003a; U.S. EIA, 2003c

# California Energy Supply: Natural Gas



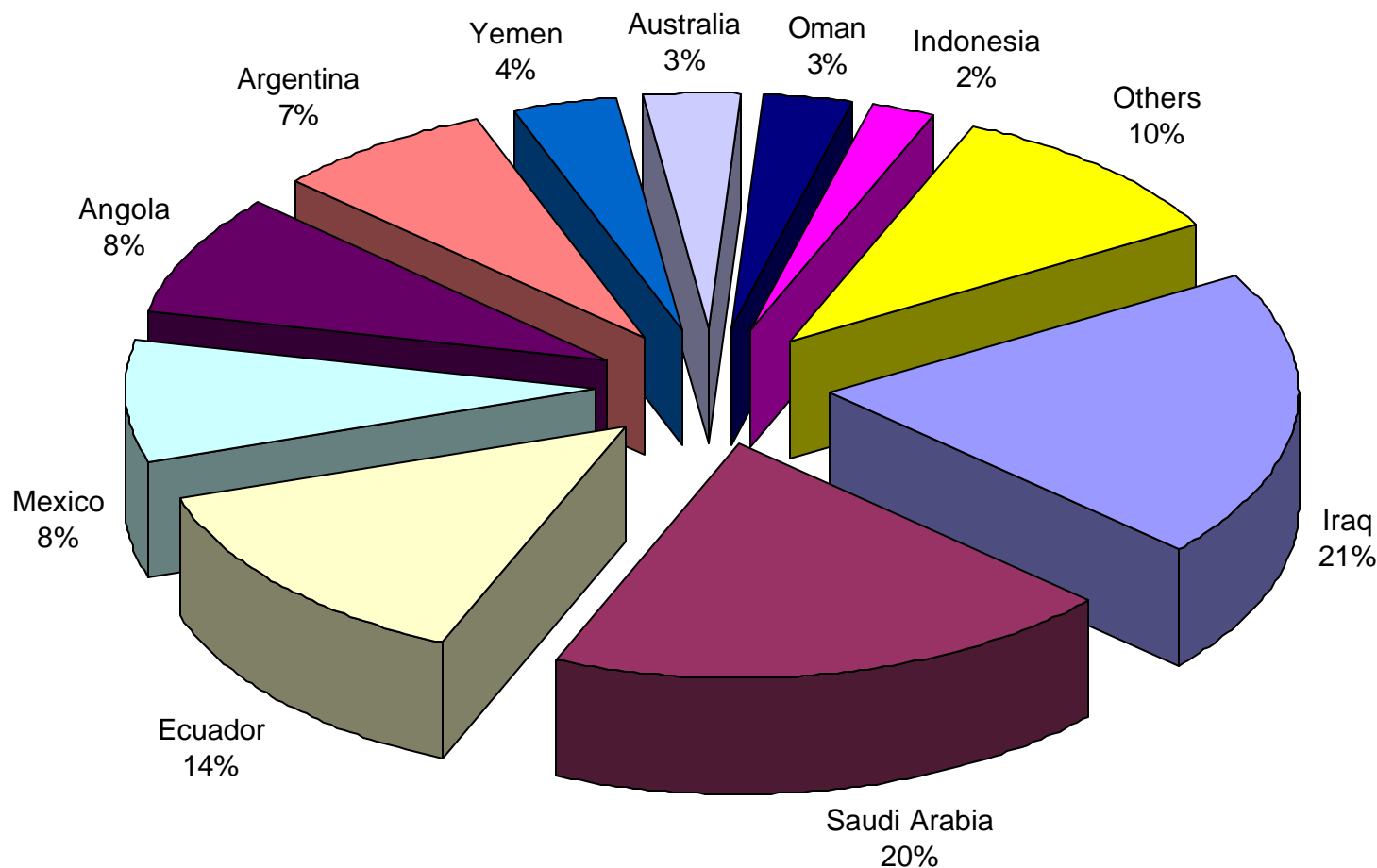
Source: CEC, 2004d

# Sources of California Crude Oil, 1982 to 2001



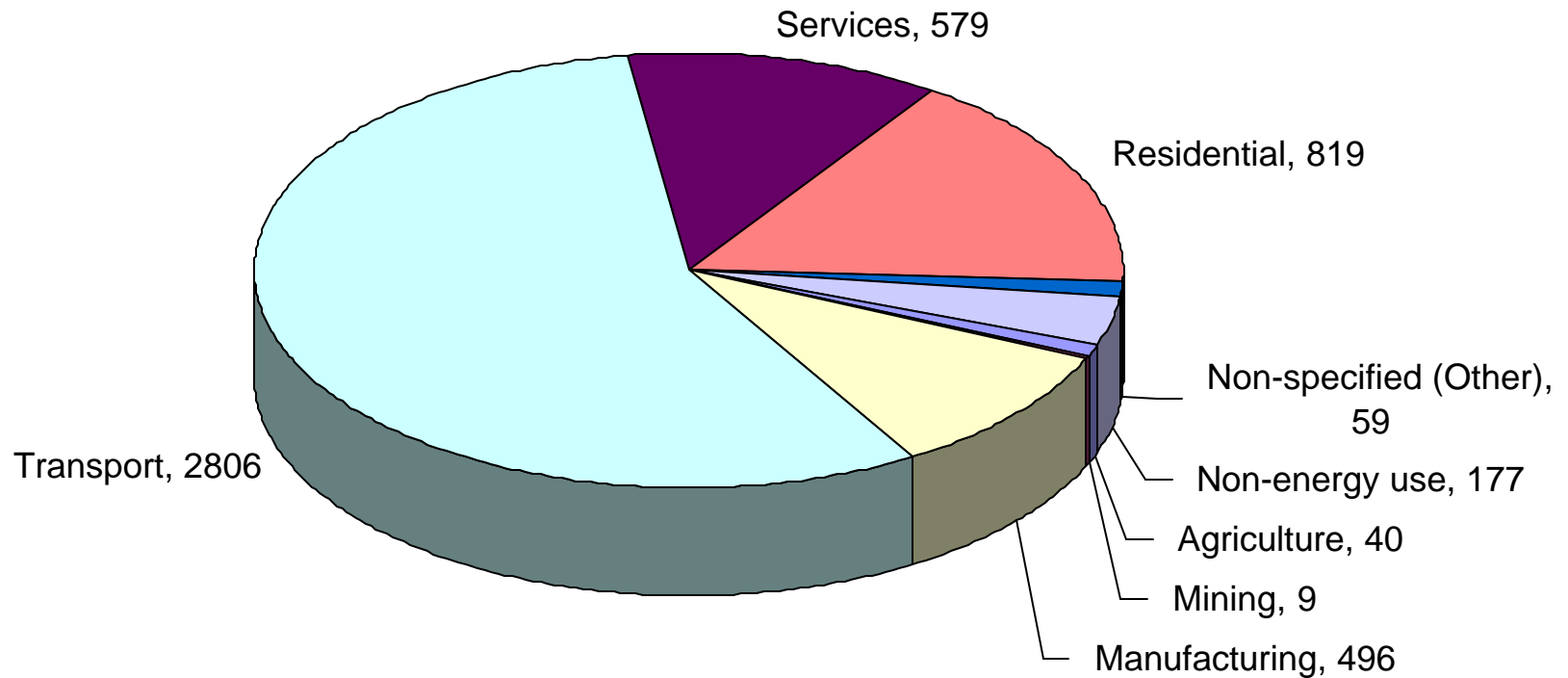
Source: CEC, 2004e; California Department of Conservation,

# Sources of Foreign Crude Oil Imported to California, 2002

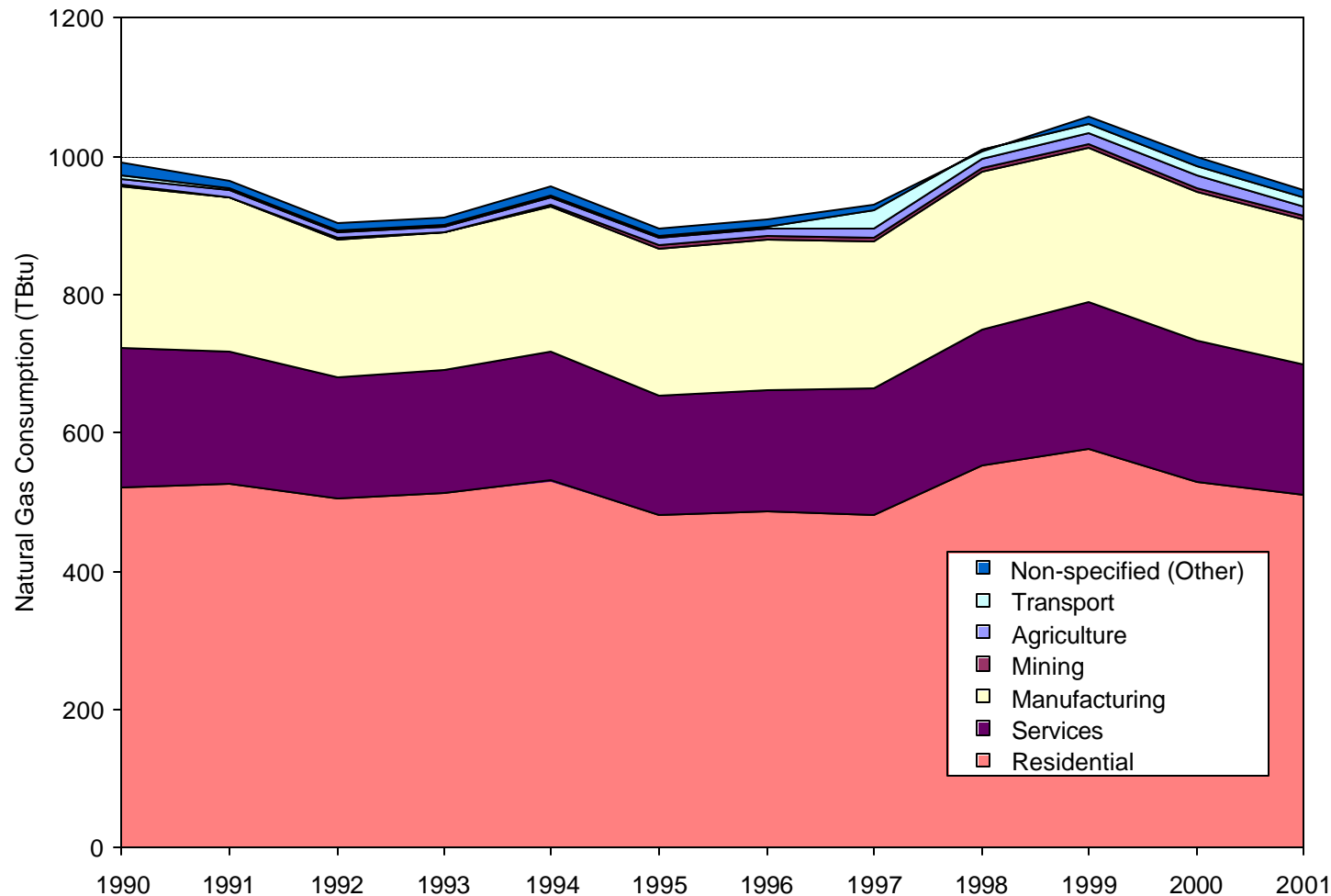


Source: CEC, 2004f

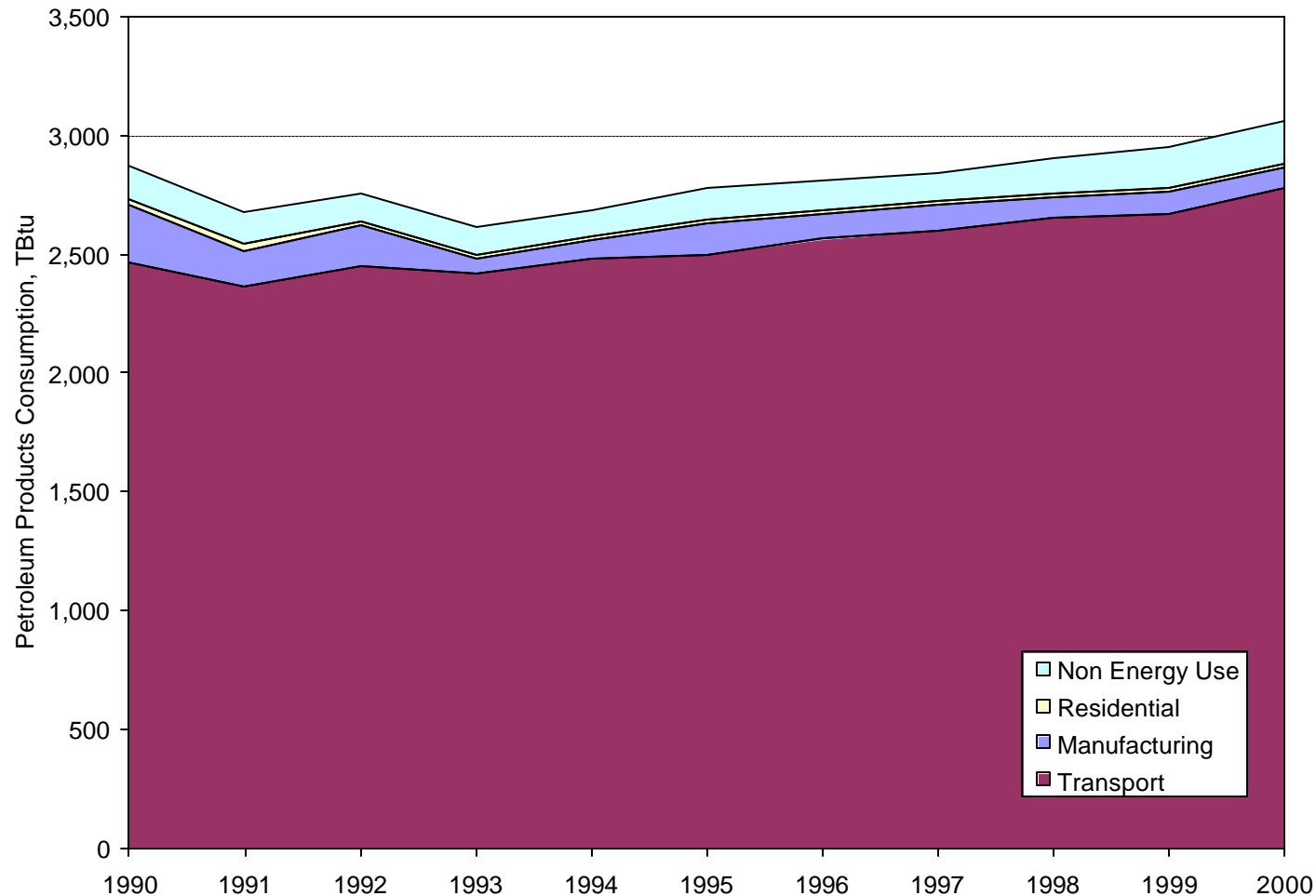
# Consumption: End-Use Sectors, 2000



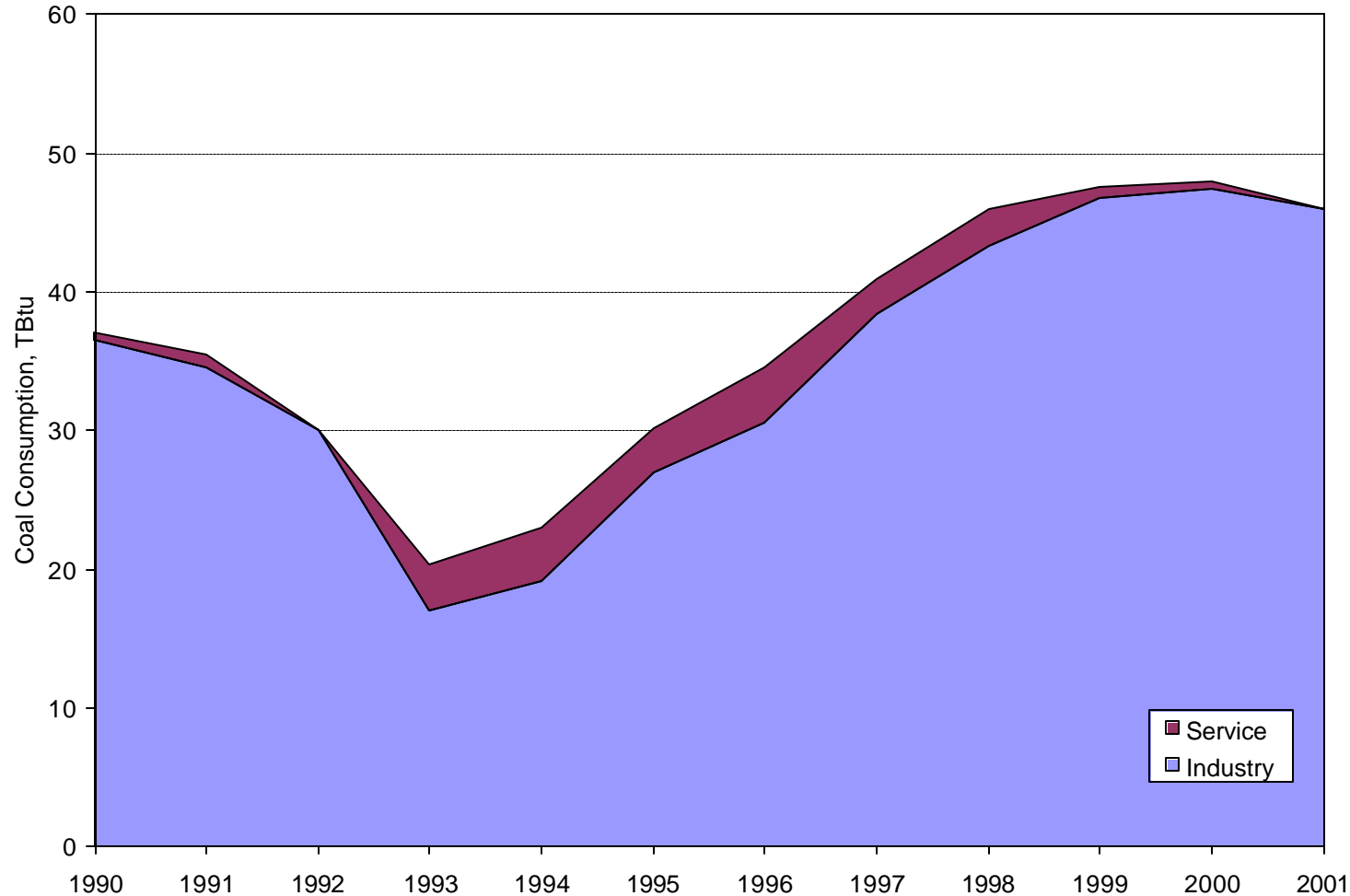
# End Use Consumption: Natural Gas, 1990-2001



# End Use Consumption: Petroleum Products, 1990-2001

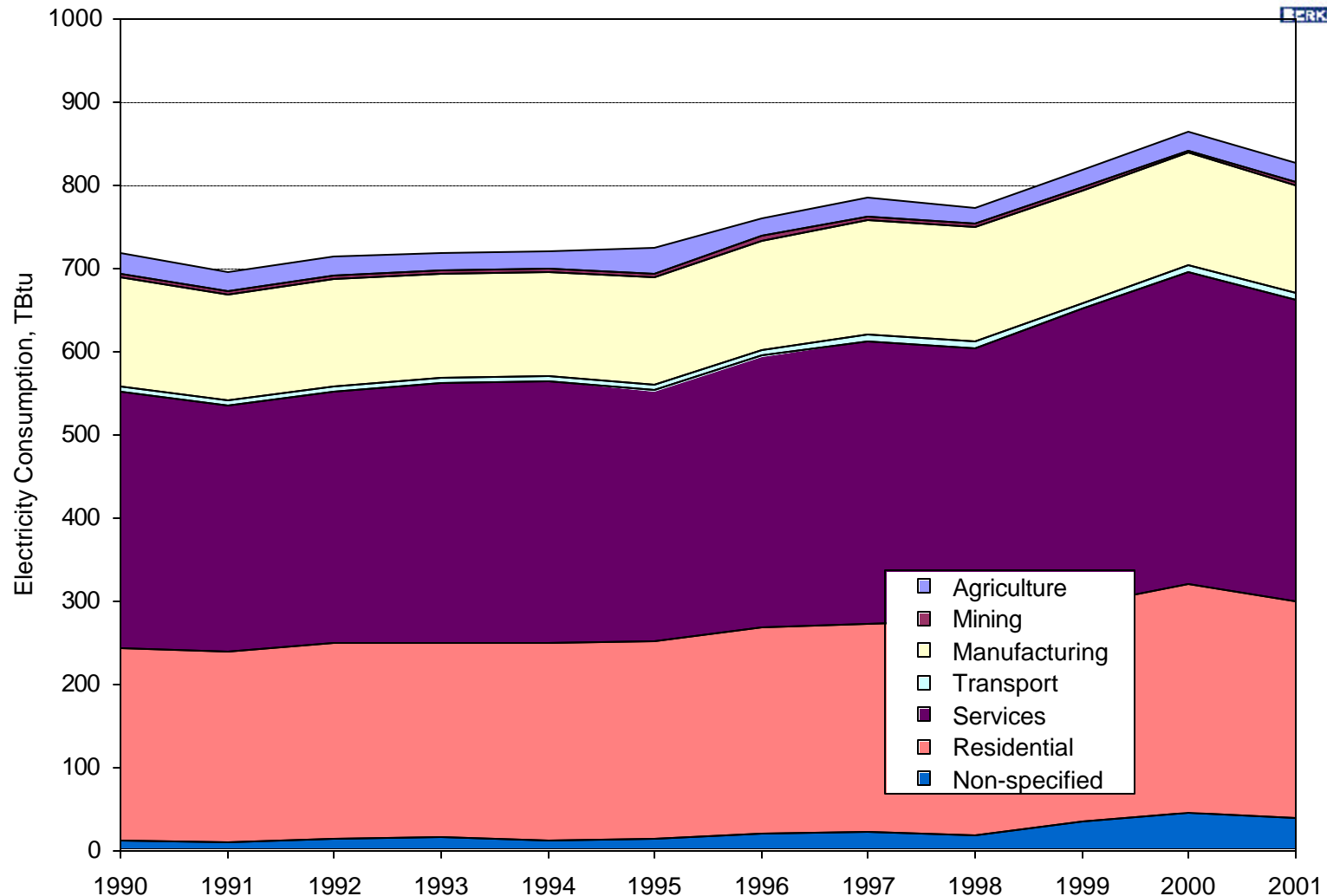


# End Use Consumption: Coal, 1990-2001





# End-Use Consumption: Electricity, 1990-2001



# Acknowledgments and Contact Information

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